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TP 1624

Marine Casualty Investigations

Enquêtes sur les accidents maritimes

Investigation Report to the Minister pursuant to sections 542 or 545 of the Canada Shipping Act

Rapport d'investigation au Ministre conformément aux articles 542 ou 545 de la Loi sur la marine marchande du Canada

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REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES ATTENDING THE STRIKING OF THE PROTECTION PIER OF THE B.C. HYDRO BRIDGE IN THE NORTH ARM OF THE FRASER RIVER, BY THE BARGE "SEASPAN 461" ON NOVEMBER 14, 1985.

REPORT No. 440

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REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES ATTENDING THE STRIKING OF THE PROTECTION PIER OF THE B.C. HYDRO BRIDGE IN THE NORTH ARM OF THE FRASER RIVER, BY THE BARGE "SEASPAN 461" ON NOVEMBER 14, 1985.

Particulars of Vessels

Name	"SEASPAN PLANET" ex "LA DENE"	"SEASPAN 461" ex "V.T. 189"
Official No.	323230	330754
Port of Registry	Vancouver, B.C.	Vancouver, B.C.
Type	Tug	Barge
Propulsion	Diesel 571 kW	
Length - Overall	18.29 m	54.86 m
Breadth - Extreme	6.19 m	14.80 m
Depth - Moulded	3.57 m	
Construction Material	Steel	Steel
Gross Tonnage	86.2	855
Net Tonnage	38	855
Built	1964, Esquimalt, B.C.	1968, North Vancouver, B.C.
No. of Crew	2	
Draught	F: 2.29 m A: 3.05 m	F: 2.96 m A: 3.20 m
Owners (both vessels)		Seaspan International Limited North Vancouver B.C.

Navigating Equipment (tug only)

Radar	Decca Model 1914
Echo Sounder	Apelco Model MS 254
Magnetic Compass	Sea Master
Gyro Compass	Sperry Model SR 120

VHF Radiotelephone	1	Apelco Model AF40MA
	2	Apelco Model AF40M
	3	Portable Model GSP 600
Steering		Wagner, electric hydraulic

NOTE: 1. All times in this report are expressed in Pacific Standard Time (UTC minus 8 hours).

2. A glossary of abbreviations and terms may be found on page 10 of this report.

Background

At approximately 2120, on November 14, 1985, the tug "SEASPAN PLANET" was heading down the North Arm of the Fraser River with a loaded chip barge in tow when the barge took a sheer to starboard and struck the swing span protection pier of the B.C. Hydro bridge. Extensive damage was sustained by the pier with only moderate damage to the barge. The operation of the swing span was not affected.

The costs involved for the repair of the pier were estimated at $150,000 and repairs were to take about two weeks.

No pollution was reported as a result of this accident.

Narrative

The "SEASPAN PLANET" is a steel tug used to tow and "yard" barges. Her normal area of operation is Vancouver Harbour but she is utilized in the Fraser River when the workload there is heavy. She is presently used as a shift tug with alternating crews of two men, each working a 12-hour shift.

On November 14, 1985, a crew change took place on the tug which was on the Fraser River in New Westminster, at around 1940, with the relieving crew arriving by taxi from their base in Vancouver. Following the usual exchange of information between the two masters, all the equipment on the tug was checked and the tug dispatched to the Westminster Shook Mill. The tug arrived at 2020 to pick up the loaded chip barge "SEASPAN 461" which had a full load of wood chips with a deadweight of approximately 2000 short tons.

The barge was inspected visually by the crew of the "SEASPAN PLANET" and, with a trim by the stern of approximately 0.5 m and no list, the tow was started for the trip down the river. From the Westminster Shook Mill to the B.C.

Hydro Bridge, the scow followed nicely behind the tug, giving no indication of capricious handling characteristics.

At the time of picking up the tow, the tide was already ebbing and, as the tug and tow proceeded down river, the master was surprised by the strength of the current. The tide had turned off Pt. Atkinson at 1720 and by local knowledge, would turn at the B.C. Hydro Bridge about one hour later.

The approach to the South Channel was made in the normal manner, with a long and gradual turn to line up the bridge. When the tug was approximately 50 m from the eastern end of the bridge and going at half-speed, the barge took a slight sheer to port, a not unusual occurrence since barges do not always follow exactly in the tug's path. The master counteracted this by increasing power to about three-quarter speed and the scow reacted, as expected, by coming back astern of the "SEASPAN PLANET". The master then brought the speed back to half.

As they were by that time entering the south channel, the deck-hand, as was his habit, left the wheel-house to stand by the winch brake located towards the stern of the vessel. As he walked to the stern, the barge took a star-board swing, heading directly for the bridge; the impression was that the stern had been caught by an underset and brought about to port.

The master tried unsuccessfully to re-align the barge by increasing the speed but the barge hit the south-east "hip" of the protection pier with her forward starboard corner, ripping away the eastern half of the protection pier consist-ing of approximately 26 pilings and 90 planks. The barge was stopped for a moment when she hit the concrete island pier which supports the swing span, but the tide then carried her downstream.

When the scow first hit the protection pier, the deck-hand, now standing by the winch, released the brake to let out some line. The master had been slowing down the tug and both tug and barge drifted out of the passage with about 15 m of towline between them.

The master called his office and it was agreed to secure the barge at the Sea Island tie-up to have it inspected. The office dispatcher then called the duty Port Captain to advise him of the accident. The Port Captain arrived at the B.C. Hydro Bridge at 2345 when he boarded the "SEASPAN PLANET" and checked the barge and the bridge.

It was decided to leave the barge at its mooring since damage seemed to be concentrated above deck where some planks had pushed their way through the protective steel plating at the forward end of the box. Also, a survey by an insurance surveyor appeared to be required.

After checking the damaged pier, the Port Captain phoned the tug office dispatcher by land phone requesting that B.C. Hydro be advised of the incident. The B.C. Hydro train dispatcher, upon being notified, went to investigate and reported to his office at the beginning of normal working hours.

A Notice to Shipping (W-2667) was issued on November 15, 1985 that read as follows:

> "The B.C. Hydro bridge in North Arm of the Fraser River has a badly damaged south pier. [sic] Mariners are requested to use the North Channel if possible and proceed through the bridge with utmost caution until further notice."

Analysis

1. As a result of this casualty, the tug "SEASPAN PLANET" suffered no damage; the barge "SEASPAN 461" was damaged at the forward starboard side of the cargo box when some planking and the box's steel protection plate were pierced by planks torn off the bridge's protection pier. This damage did not affect the seaworthiness of the barge.

   There were no reported mechanical breakdowns which contributed to this casualty.

   The master had twenty years of towing experience for the same company, with eight years as master. The last three and a half years were on shift tugs mainly in Vancouver Harbour; consequently the north arm of the Fraser River was not his everyday work location.

   Harbour tugs are normally sent to replace river tugs when the workload so requires or when a river tug is broken down as was the case in this instance.

2. The protection pier of the B.C. Hydro Bridge sustained heavy damage when the corner of the barge ripped through it from the south-east corner to the concrete island which supports the swing span, at the middle of the bridge, a length of approximately 35 m. About 26

pilings and 90 planks, which formed the whole upper middle half of the south side of the protection pier, were torn down.

The mid-channel section of the B.C. Hydro or Marpole Bridge, as it is known locally, consists of one centre swing span pier and two "rest" piers all built of concrete on steel 'H' piles. The swing span is built of steel and rotates about the centre pier, with the two extremities of the bridge resting on the "rest" piers when the bridge is open to marine traffic.

These three concrete piers are protected by a wooden pier constructed of piling, about 18 m high, driven to "refusal" (about 5 - 5.5 m in that area) and reinforced by other pilings, about 16 m high, driven at an angle and bolted to the vertical piles. A series of horizontal planks 15 cm thick, 30 cm wide and of various lengths are nailed to the piles to form a wooden wall, about 5 m high, that absorbs the various shocks caused by the traffic.

The channel widths on both the north and south sides are 36 m.

When planks or piles are broken or torn and have been found but not reported, they are repaired by B.C. Hydro as part of its regular maintenance program.

3. On this occasion repairs to the bridge were estimated at $150,000 and could take up to four weeks to complete.

Divers were hired to inspect for any underwater damage to the dolphins on both sides of the protection pier, but everything appeared to be normal.

No delays were reported either to the maritime or the railway traffic because of this casualty.

NOTSHIP W-2700 issued on 19 November 1985 reads:

> "Commencing 18 November 1985 until approximately 19 December, 1985, Fraser River Pile Driving will be operating in the South Channel of Marpole Railway bridge, upstream from the bridge. Equipment will be anchored across the South Channel which will be closed to all marine traffic. Mariners are requested to proceed with caution when transitting [sic] the area."

4. Five days after this incident the same bridge was hit again, but this time by a tug and barge westbound through the North Channel. As reported by the tug master, the approach and the actual 'shooting' of the bridge were made without incident. As the tug was clearing the west side of the channel, a pull was felt on the tug and the Master realized that the after end of his barge had hit the 'hip' of the protection pier of the bridge.

   He tied up his barge so that he could go back and inspect the area for possible damage. At that time, the master and the bridge tender on duty determined the damaged to be relatively minor. The tide was flooding at the time.

   Due to the previous accident, the protection pier seemed to be leaning in to the north channel and it is possible that the starboard corner guard aft could have become caught on some bridge planking; in this second instance there was no indication that the stern was set against the bridge.

   In the second incident, the master had 16 years towing experience with 10 years as master, but only 6 months as master in the North Arm of the Fraser River.

   The estimated cost for that damage was a further $20,000.

5. There is no bridge tender on duty at night since trains use the bridge only twice a day, once in the morning and once in the afternoon. Except for those two crossings, the swing span is kept open for marine transits.

   Minor contacts between barges or log tows and the protection pier are only reported subject to the conscience of those involved.

6. The following damage data on the bridge was obtained from B.C. Hydro:

   Since 1978 there have been 21 reported strikings resulting in damage costs from $4000 to $115,000. In August 1980, a striking resulted in a damage bill of $164,000 including $120,000 for bridge repairs with 14 days lost.

   It is estimated that there are 12 - 15 strikings every year with unreported damage in the order of $1000; this is repaired as part of the regular maintenance of the bridge.

Reported strikings since 1978 are broken down as follows:

1978 (4)	1982 (3)
1979 (1)	1983 (2)
1980 (4)	1984 (0)
1981 (5)	1985 (?

No more detailed statistics are kept that would permit a pattern to be determined but it is apparent that the major damage is caused by barges and the minor damage by log tows.

7. There is no estimate available of the number of daily transits through the bridge; one major company could however, have as many as 15 - 20 tug and barge transits every day. There are many companies and many more small "independents" that make the passage on a daily basis. It is evident, therefore, that the channel at the B.C. Hydro Bridge is very heavily used and that the number of reported accidents is minimal compared to the number of transits.

   In general, North Arm Fraser River bridges are rated, by Transport Canada publication TP3446E, "Vulnerability of Bridges in Canadian Waters", as having a "fairly low vulnerability" to a ship/pier collision because of "the type and density of marine traffic on this section of the Fraser River."

8. The historic normal practice at the bridge is for all eastbound traffic to use the North Channel while westbound traffic uses the South Channel. It seems that the reason for such a pattern of traffic is that the log tows, when eastbound on a flood tide, prefer to use the north side of the channel as it is the easiest and safest way for them to line up with and 'shoot' the bridge.

   However, it is also local practice that vessels can use whatever side of the channel is more convenient for that transit and the decision is left to the master.

9. The North Fraser Harbour Commission By-Laws, under the heading "Navigation and Passage of Vessels with Tows through Eburne Bridges Nos. 4 and 5 and B.C. Electric Bridge" article 47 reads:

   "(a) no vessel shall pass through the swing span with one or more scows or barges in tow unless all vessels are comple-

tely under control and the master shall exercise due caution having regard to all conditions affecting navigation at the time of passage;

(b) every vessel towing one or more loaded scows or barges through the swing span opening with the tide shall have an assisting tug;"

These by-laws require revision as they do not reflect the actual shipping conditions. For example, they mention Eburne Bridges Nos. 4 and 5 which no longer exist and B.C. Electric which is now known as B.C. Hydro.

The by-laws are now being re-written to reflect existing conditions and 47 (b) will no longer appear. By-Law 47 (b) is deemed to be obsolete, its purpose having been lost through the years with the changes in river traffic and increased power of tugs.

10. On an ebb tide there is a set towards the north-west; this set is obviously more pronounced during the ebb on large tides but there are no official reports of cross currents except that sometimes the stern of a barge has a tendency to swing in either direction.

There has been no study of the different currents and sets for that part of the river and masters have to rely on local knowledge and experience to go through the bridges in the North Arm of the Fraser River. On different occasions and with an ebb tide, tugs were observed going through the Marpole Bridge while towing chip barges and the passages were found to be normal and without incident.

11. The marine area forecasts for B.C. Coastal waters issued by Environment Canada at 0445 PST, Tuesday, 19 November 1985, valid until 0500, Wednesday; read in part:

"GEORGIA STRAIT.

Winds east to southeast 10 to 20 knots increasing this evening to northerly 20 to 25 knots. In mainland inlets northeast outflow winds 20 knots increasing to 30 tonight. Snow followed by gradual clearing overnight.
Visibility less than one mile in snow."

At the time of the accident the wind was NE 10 with a

clear night and visibility of 5 miles.

Findings

The B.C. Hydro Railway bridge in the North Arm of the Fraser River sustained heavy damage to the protection pier and the barge "SEASPAN 461" suffered minor damage following a striking by the barge while being towed down river on November 14, 1985, due to the tug not having complete control of the barge.

It would appear that the following factors contributed to the casualty:

- going through the bridge at maximum ebb on one of the largest tides when there are irregular swirls and eddies of the current, and

- the master not being thoroughly familiar with the North Arm of the Fraser River;

The actions taken by the crew of the tug, after the striking, were effective in minimizing any further damage.

Other Findings

The use of an assist tug at the bridge may have prevented this casualty.

OTTAWA, ONTARIO
OCTOBER, 1986.

Glossary

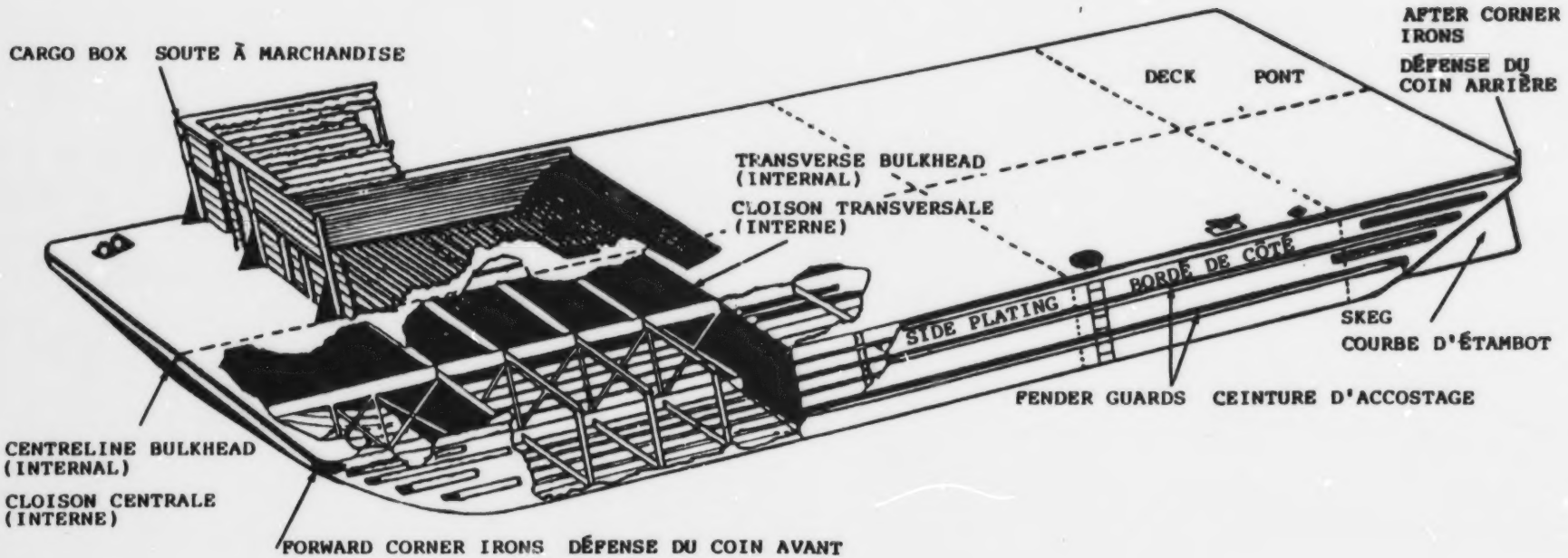
ebb	the reflux or falling tide
hip	the join of the face and approach walls of a wharf or pier
nose	the extremity of pier structure
sheer	a deviation from the line of the course
shooting	local term denoting passaging through a narrow channel
swing-span	the pivoting centre section of a low bridge which can be positioned to allow the passage of either land or marine traffic
to refusal	as deep as possible in the river bottom
tow	a vessel or a number of vessels which are towed
trim by the stern	when the draught at the stern is greater than the forward draught
underset	a current of water below the surface in a direction contrary to that of the water on the surface
to yard	to manoeuvre or position in the berthing area

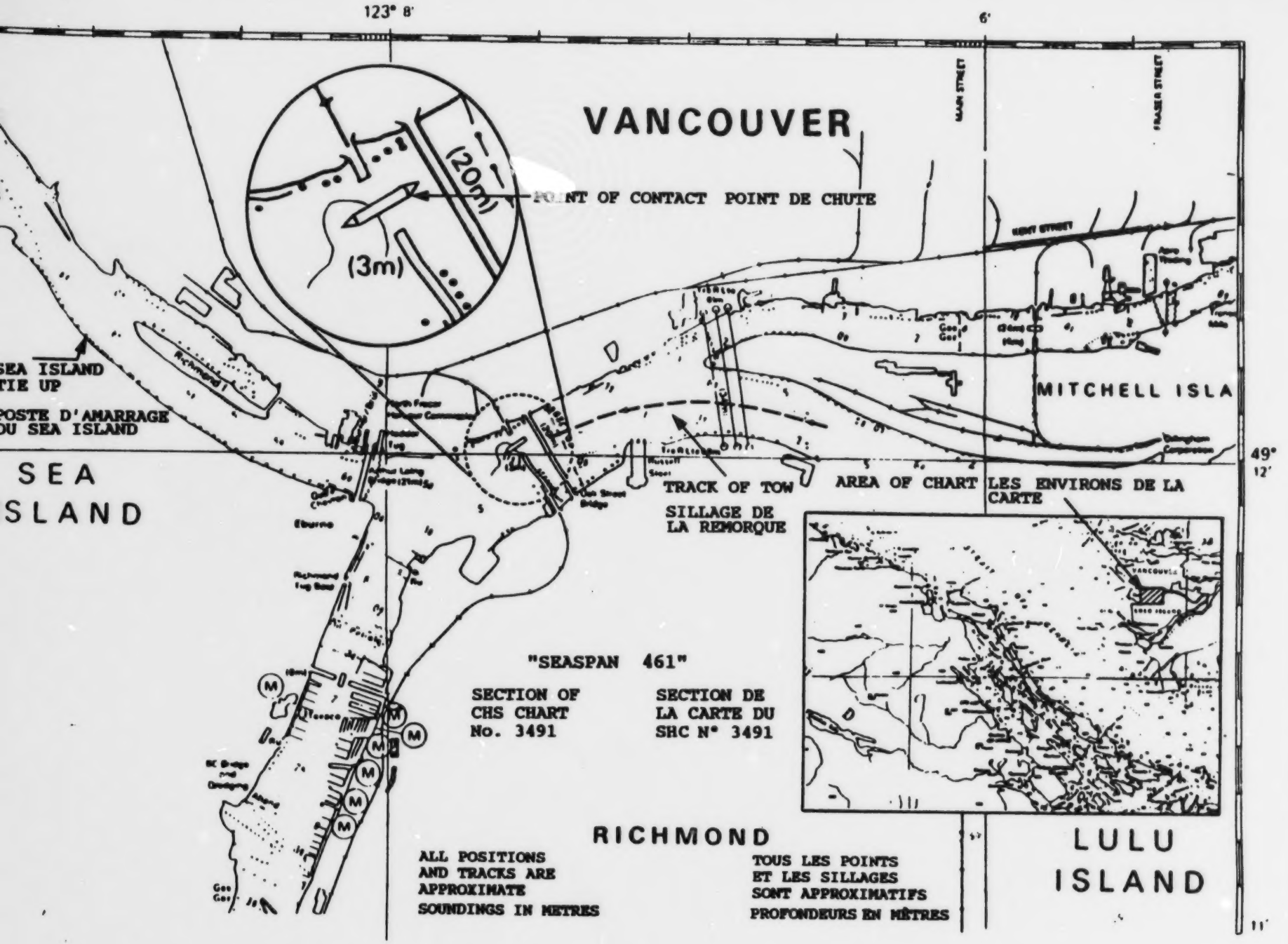
TYPICAL STANDARD STEEL FLAT DECK BARGE

SIMILAR TO "SEASPAN 461"

CHALAND STANDARD EN ACIER MUNI D'UN PONT PLATE-FORME TYPIQUE

SEMBLABLE AU "SEASPAN 461"




123° 8'
6'
VANCOUVER
(20m)
(3m)
POINT OF CONTACT POINT DE CHUTE
MAIN STREET
FRASER STREET
KENT STREET
SEA ISLAND TIE UP
POSTE D'AMARRAGE DU SEA ISLAND
SEA ISLAND
MITCHELL ISLA
49° 12'
TRACK OF TOW
SILLAGE DE LA REMORQUE
AREA OF CHART
LES ENVIRONS DE LA CARTE
"SEASPAN 461"
SECTION OF CHS CHART No. 3491
SECTION DE LA CARTE DU SHC N° 3491
RICHMOND
LULU ISLAND
ALL POSITIONS AND TRACKS ARE APPROXIMATE
SOUNDINGS IN METRES
TOUS LES POINTS ET LES SILLAGES SONT APPROXIMATIFS
PROFONDEURS EN MÈTRES
11'

"SEASPAN 461"

AT SEA ISLAND TIE UP

AU POSTE D'AMARRAGE
DU SEA ISLAND

PLANKING FROM PROTECTION PIER
PIERCING CARGO BOX

BORDÉ DE LA DÉFENSE DE LA JETÉE
TRANSPERCE LA SOUTE À MARCHANDISE

MARPOLE RAILWAY BRIDGE

PONT DE CHEMIN DE FER MARPOLE

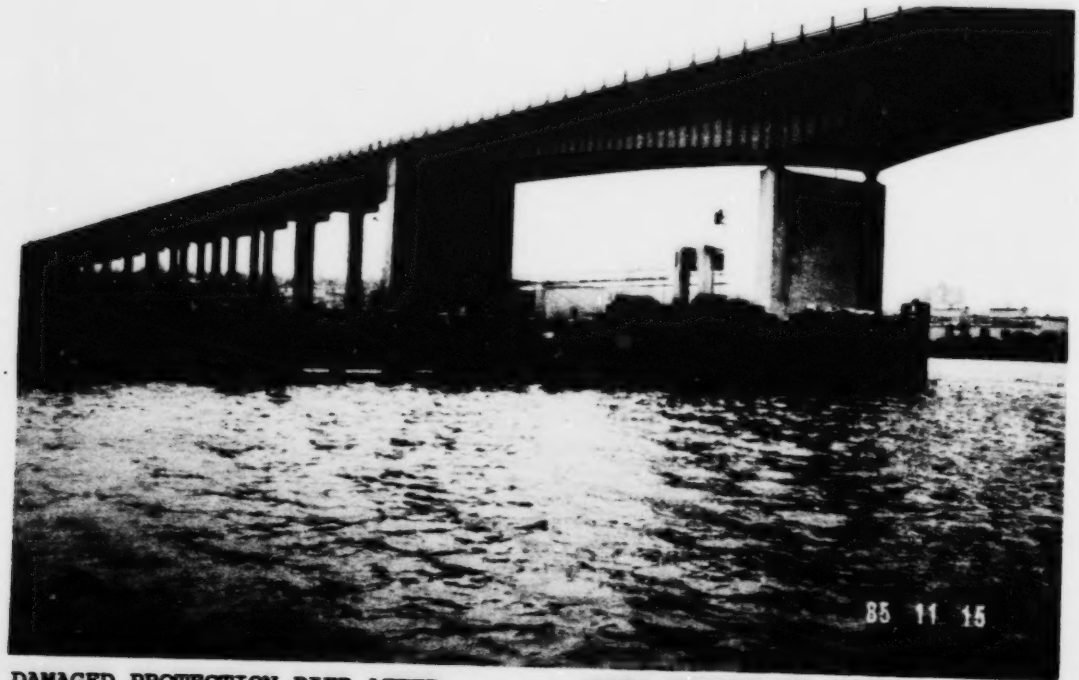
SWING SPAN PONT TOURNANT

HIP (POINT OF CONTACT)
HANCHE (POINT DE CHUTE)

PROTECTION PIER NOSE MUSOIR
PILIER DE PROTECTION

SWING SPAN OPEN TO MARINE TRAFFIC
(AFTER REPAIR)

TABLIER PIVOTANT OUVERT AU TRAFIC
MARITIME (APRÈS LES RÉPARATIONS)



DAMAGED PROTECTION PIER AFTER
INCIDENT

JETÉE ENDOMMAGÉE APRÈS L'INCIDENT